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Criteria and Indicators for Sustainable Rangelands

Executive Summary

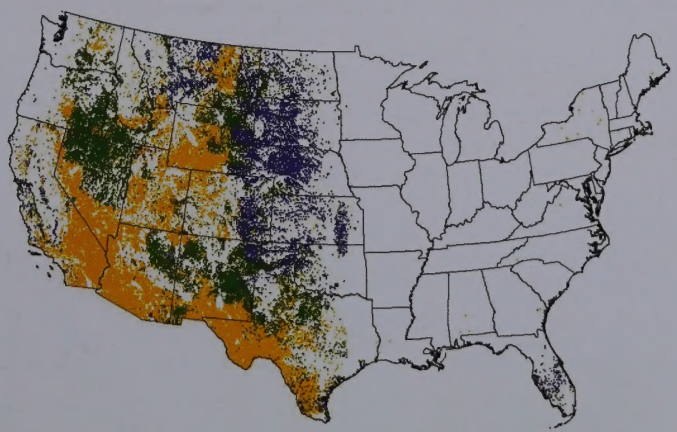
SRR Participating Organizations

Agricultural Research Service
American Farm Bureau
Arizona State University
Boulder County Parks & Open Space
Bradley University
Bureau of Indian Affairs
Bureau of Land Management
Chippewa Cree Tribe
Colorado State University
Confederated Tribes of Warm Springs
Council on Environmental Quality
Ecological Society of America
Economic Research Service
Environmental Protection Agency
Forest Service
Gray Ranch and Malpai Borderlands Group
Hopi Tribe
Idaho Conservation League
Invasive Species Advisory Committee
The H. John Heinz III Center
Lady Bird Johnson Wildflower Center
Montana State University
National Association of State Foresters
National Cattlemen's Beef Association
National Park Service
National Wildlife Federation
Natural Resources Conservation Service
New Mexico State University
Northern Arizona University
Oak Ridge National Laboratory
Oklahoma State University
Oregon State University
Pacific Northwest National Laboratory
Public Lands Council
The Quivira Coalition
San Antonio Water System
Society for Conservation Biology
Society for Range Management
South Dakota State University
Texas A&M University
The Nature Conservancy
University of Arizona
University of California
University of Colorado
University of Idaho
University of Nevada, Reno
US Department of Agriculture
US Department of the Interior
US Fish and Wildlife Service
US Geological Survey
Utah State University
Washington State University
Western State Land Commissioner's Association
World Wildlife Fund
Wyoming State Grazing Board

Rangelands constitute approximately 770 million acres of the U.S. land base and provide commodity, amenity, and spiritual values that are vital to the well-being of counties, regions, and the Nation. These goods and services include forage for grazing animals, critical species and wildlife habitat, water storage and filtration, carbon sequestration to mitigate global warming, recreation opportunities, and a way of life for rangeland-dependent human communities. Despite the importance of this unique resource, trends in ecological, economic, and social rangeland sustainability are not consistently monitored or reported.

The Sustainable Rangelands Roundtable (SRR) is a collaborative partnership process with over 50 organizations, jointly funded by Colorado State University, the USDA Forest Service, Bureau of Land Management, and U.S. Geological Survey to assess rangeland sustainability. Participants include rangeland scientists and managers, ecologists, sociologists, economists, policy and legal experts, environmental advocates, and industry representatives. This open, inclusive enterprise has distilled a set of five criteria and 64 indicators embodying social, economic, and ecological factors that form a framework for standardized, periodic rangeland inventory and monitoring at multiple scales. SRR does not endeavor to set policy but rather to provide information through the criteria and indicators to enhance the quality of debate about rangeland management issues.

SRR's *First Approximation Report on Criteria and Indicators for Sustainable Rangelands* describes a method for assessing rangeland sustainability and represents a milestone in collaborative development of significant rangeland metrics. While data currently is gathered for many of the indicators, it is not consistently collected, analyzed, and reported across organizations or efforts. This first approximation report offers a discussion of sustainable development in relation to rangelands and the SRR process. The introduction sets the stage for individual chapters addressing each criterion and supporting indicators. A final chapter outlines future directions and areas of emphasis for SRR's next phase of work, addressing linkages to other criteria and indicator efforts and detailing priorities and challenges.



Rangeland ecosystems account for one-third of the lands in the U.S., including Great Plains grasslands, savannas in Texas and Florida, sagebrush steppe and shrublands in the Great Basin, Alaskan tundra, alpine meadows, wetlands, and Southwestern deserts. Map courtesy of USDA Forest Service showing grasslands (purple), shrublands (orange), and mixed shrub-steppe vegetation (green).

Sustainable Rangelands Roundtable Mission

The SRR will promote social, ecological, and economic sustainability of rangelands through the development and widespread use of criteria and indicators for rangeland assessments, and by providing a forum for dialogue on sustainability of rangelands.

Criterion 1: Conservation and Maintenance of Soil and Water Resources on Rangelands

Soil and water provide the media for ecosystem processes. Primary production of ecosystems requires soils and water to support energy capture and flow. Ten indicators have been identified to address soil erosion by water and wind, soil organic matter, soil aggregate stability, bare ground, soil microbial activity, biodiversity of aquatic organisms, water quality, ground water systems, stream channel geometry, and frequency and duration of no-flow periods in rangeland streams.

Criterion 2: Conservation and Maintenance of Plant and Animal Resources on Rangelands

The capacity of rangelands to function, produce commodities, and satisfy societal values on a sustained basis depends on internal, self-sustaining ecological processes, including the structure and functional dynamics of plant and animal communities. Ten indicators capture aspects of ecological sustainability including: location and amount of rangelands, vegetation communities, and wetlands; fragmentation of rangelands, including by roads and human structures; fire regimes; condition of riparian systems; infestation by invasive plants; distribution of species and communities of concern; and population status of rangeland-dependent species.

Criterion 3: Maintenance of Productive Capacity on Rangeland Ecosystems

Rangelands have the capacity to provide current generations with a wide variety of goods and services. The productive capacity of rangelands is based on biophysical factors (climate, soil, and plant composition), as well as historic and current uses. Maintenance of productive capacity implies that future generations also will be able to obtain their desired mix of market and non-market goods from rangelands. Productive capacity includes more than forage-based products, such as livestock, and addresses non-forage goods, such as wildlife habitat, open space, medicinal plants, and wood products. Six indicators quantify above-ground biomass, annual productivity, livestock and acres grazed by livestock, wildlife, and non-forage plant products.

Benefits of Criteria and Indicators for Sustainable Rangelands

SRR criteria and indicators describe individual elements to be monitored to determine trends in resource condition, management, economic benefits, and social values derived from rangelands. While interpretation or conclusions may be contentious, the collaborative roundtable process ensures that the criteria and indicators provide common ground for discussion. Efficiencies for public and private rangeland managers and stakeholders include:

- An agreed upon framework for data collection and periodic standardized reporting to more clearly depict rangeland management performance and to minimize duplication in reporting standards.
- Common assessment capabilities at multiple scales among a wide range of users, permitting local, regional, and national comparisons.
- Increased likelihood of obtaining complete coverage of key attributes to monitor.
- Research by agencies, universities, and organizations focused on developing methods to address data gaps and research needs associated with criteria and indicators.
- Enhanced agency performance planning and prioritization of funding for at-risk areas.
- Monitoring efforts directed to sites identified by indicators as being important.
- Improved accountability for rangelands stakeholders and Congress through multi-scale, coordinated data reporting and assessment of compliance with applicable laws.
- A basis for stakeholder dialogue at local, regional, and national scales and expanded understanding of rangeland sustainability.

Sustainable Rangelands Roundtable Vision

We envision a future in which U.S. rangelands provide a desired mix of social, economic, and ecological benefits to current and future generations; and criteria and indicators for monitoring and assessing the economic, social, and ecological sustainability of rangelands are widely accepted and used.

Diverse rangelands accomodate multiple uses including livestock grazing, wildlife habitat, and recreation. Photo Credits (left to right): National Cattlemen's Beef Association, stock photo, and National Park Service.

Criterion 4: Maintenance and Enhancement of Multiple Economic and Social Benefits to Current and Future Generations

The ability of rangelands to produce goods and services desired by society is assessed in socioeconomic terms; however, few range-specific measures of social and economic attributes exist. The importance of monitoring the social component of sustainability becomes more obvious as difficulties faced by rangeland managers are publicized. Socioeconomic indicators provide a measure of society's values that reflect allocation of scarce economic resources, and illustrate how changes in ecological, legal, and political systems are manifested in economic systems. Twenty-eight indicators have been developed focusing on demographic change in rangeland-dependent areas, community well-being, structure of economic activity, structure of government and social services, social structure quality, patterns of land tenure, and use/production related issues. These issues encompass both traditional forage-based uses and nontraditional, non-consumptive uses, such as recreation.

Criterion 5: Legal, Institutional, and Economic Framework for Rangeland Conservation and Sustainable Management

Indicators within this criterion define the extent to which U.S. laws, regulations, guidelines, and policy frameworks support conservation and sustainable management of rangelands. Issues of equity, economic efficacy, cultural traditions, legal rights and obligations, and advancing management theories and skills greatly influence the long-term sustainability of our Nation's rangelands. Ten indicators focus on the ability of the U.S. legal, institutional, and economic framework to support rangeland conservation and sustainable management, as well as the capacity to measure and monitor changes on rangelands and to conduct and apply research and development to management. Areas of emphasis are: land law and property rights; institutions and organizations; economic policies and practices; public information and participation; professional education and technical assistance; land management; planning, assessment, and policy review; protection of special values; measuring and monitoring; and research and development.

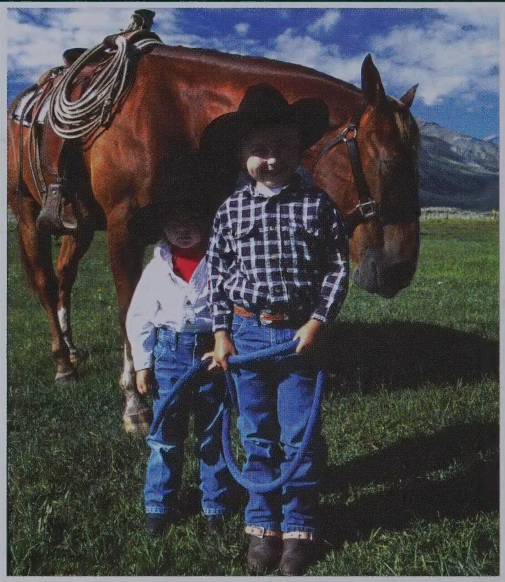
Disturbances including fire, erosion, and the establishment of invasive plants impact rangeland sustainability. Photo Credits (left to right): Konza Prairie, Jeff Vanuga, USDA Natural Resources Conservation Service, and John Randall, The Nature Conservacy.

Future Plans and Priorities

SRR's future efforts will center upon: criteria and indicator application and revision; data set identification and analysis; comprehensive communication planning and outreach efforts; interagency and organizational coordination; and development of multi-scale research protocols and prioritization. Despite this expanded focus, SRR's primary purpose continues to be criteria and indicator development and refinement, with increased emphasis on identification of indicator data sets, data quality and consistency, and data needs.

Ongoing work will be enhanced by aggressive outreach and marketing initiatives to promote the importance of sustainable rangelands, as well as wide acceptance and use of SRR criteria and indicators. Highlights include: implementation of a detailed communication plan; development of educational and interpretative materials; and creation of local, regional and national criteria and indicator interpretations and assessments. SRR also will continue to provide a forum for stakeholder dialogue on multi-scale applications of criteria and indicators for sustainable rangelands.

Interaction with parallel rangeland sustainability efforts is equally important. SRR has considered indicator products of other roundtables, federal agencies, states, NGOs, and international efforts. Tasks planned to improve coordination include: obtaining agency commitments to establish formal agreements with SRR to define roles and responsibilities; convening a workshop to identify data sets, sources, gaps, incompatibilities, and quality; and improving communication with organizers of local and regional assessment programs to distinguish on-the-ground management applications of national criteria and indicators.



SRR criteria and indicators contribute toward a future in which U.S. rangelands meet the needs of current generations without compromising the ability of future generations to meet their needs; photo courtesy National Cattlemen's Beef Association.

Additionally, SRR will promote research to develop methods for measurement and analysis pertinent to sustainable rangeland indicators at multiple scales. Priority research topics addressing interrelationships and relevance of ecological, economic, and social indicators to rangeland sustainability also will be identified. Potential projects include: scientific evaluations of the indicators and reliability of their relationship to the criteria; statistically-based, benefit-cost analyses on indicator use; and assessments of probabilities for successful application and stakeholder acceptance of the criteria and indicators.

Challenges

Achievement of these goals and objectives is contingent upon stable and adequate funding and resources to support new and ongoing efforts and satisfy future reporting needs. Associated challenges that must be addressed include: database management, accuracy, consistency, and integration issues; selection of appropriate and complementary operational definitions of forest and rangeland; implementation of the National Vegetation Classification System and conversion of existing systems; and establishment of protocols to deal with complex scale issues and interactive properties of human community and economic indicators.

While these challenges must be met for optimal application of SRR criteria and indicators, this endeavor and related sustainability efforts invite innovation and experimentation. Thus, the future of sustainable resource management is brimming with fresh opportunities to develop cooperative research protocols and partnerships, expand information exchange, and employ standardized periodic reporting for improved monitoring and assessment. SRR's efforts will continue as a flexible, dynamic journey, exploring new frontiers and collaborative partnerships to fulfill the SRR mission and vision of social, ecological, and economic rangeland sustainability.

For the complete SRR report, please visit http://SustainableRangelands.cnr.colostate.edu